Global vision.
Local knowledge.

Cisco Connect 2019
Croatia, 29th March 2019
Cisco Catalyst 9000 Switching

Foundation for a new era in intent-based networking

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Cisco Systems Engineer
29.03.2019.
Trends in Enterprise IoT

- 7.5B Things
- Infrastructure convergence vulnerable endpoints
- Changing workforce and apps hyper-connected
- Mobility
- 3.64 Devices per person
- 100K Devices
- Devices per Admin
- AWS Windows 10
- Agility consumption models
- Security
- Average cost of a data breach: $3.5M
- Enterprises
- Cloud
- 100,000 Devices
Intent-based networking

Translation
- Capture business intent, translate to policies, and check integrity

Activation
- Orchestrate policies and configure systems

Assurance
- Continuous verification, insights and visibility, and corrective actions

Powered by intent. Informed by context.
The need for intent-based networking

Catalyst 9000 Switches

Powered by intent. Informed by context.

Learning

Intent

Context

Security

Best-in-class products
Cisco’s Catalyst 9000 Switching Platform

Intent-based and SD-Access-enabled switches across the portfolio

Cisco Catalyst 9000 Switches

- Cisco Catalyst 4500E Series
- Cisco Catalyst 3850/3650 copper
- Cisco Catalyst 2960-X/XR Series
- Cisco Catalyst 9300 Series
- Cisco Catalyst 9400 Series
- Cisco Catalyst 9500 Series
- Cisco Catalyst 6840-X/6880-X
- Cisco Catalyst 9200 Series

Access switching

Backbone switching
Cisco Software-Defined Access

Identity-based policy and segmentation
Decoupled security policy definition from VLAN and IP address

Automated network fabric
Single fabric for wired and wireless with workflow-based automation

Insights and telemetry
Analytics and insights into user and application behavior

Cisco DNA Center

Segmentation  Automation  Assurance

User mobility
Policy stays with user

IoT network  Employee network
Introducing the Cisco Catalyst 9000 switching

First in enterprise
• x86 CPU with application hosting
• Programmable ASIC
• Software patching

Unmatched in industry
• High availability
• Multigigabit density
• Cisco UPOE® scale
• 100G Ethernet
• 25G Ethernet

Future ready
• IEEE 802.11ax ready

Converged ASIC
Single image
Common licensing
Open Cisco IOS® XE
UADP ASIC

Security
IoT convergence
Mobility
Multicloud
Cisco Catalyst 9000 switching platform at a glance
Enabling a new era of intent-based networking

Catalyst 9200 Series switches
Simple branch and midmarket fixed access

Catalyst 9300 Series switches
Lead fixed access

Catalyst 9400 Series switches
Lead modular access

Catalyst 9500 Series switches
Lead fixed core

Platform innovations

Secure
- Encrypted Traffic Analytics*
- MACsec-256 bit encryption+
- Trustworthy solutions
- Group-based policy
- Full Flexible NetFlow for Cisco Stealthwatch®

IoT convergence
- Constrained Application Protocol (CoAP) and IoT device profiling
- Cisco DNA Service for Bonjour*
- Perpetual PoE
- IEEE 1588 Audio Video Bridging (AVB)*

Mobility
- Fabric-enabled wireless
- Embedded WLC*
- Distributed wireless scale
- Unified control and policy
- Wired and wireless guest access

Multicloud
- DevOps toolkit
- NETCONF/YANG models
- Streaming telemetry
- Patching/GIR
- Application hosting*

+MACsec-128 on Catalyst 9200  * not available on Catalyst 9200 Series switches
Newer Technologies Push Connectivity Requirements

Multiple links of 10G/40G

Higher Bandwidth 40G/100G

48x2.5G/5G

OS Ratio: 4:1

OS Ratio: 20:1

300/400m* (MMF)

48x1G

10G

10G

10G

10G

10G

10G

10G

10G

10G

48x2.5G/5G

40G (2 km) = $5995

100G (2 km) = $4495

Some key considerations - Ease of adoption, Price-to-performance
Enabling Architectural Transformation
Campus-optimized distance with Speed transition
10/25G optical transceivers for unsurpassed investment protection

- Dual rate 10/25G today with 10G backward compatibility
  - SFP-10/25G-CSR for Multi Mode Fiber (MMF)
  - SFP-10/25G-LR for Single Mode Fiber (SMF)

- Ease the migration from 10G to 25G
  - Connect to existing 10G optics / network elements
  - Reuse existing 10G fiber infrastructure

- SFP-10/25G-CSR
  - Cisco innovation extends the reach of 25G to match IEEE 10G reach over MMF (IEEE 25G-SR only reach’s 70/100m over OM3/4)

- SFP-10/25G-LR
  - 25G with same reach as IEEE 10G over SMF

SFP-10/25G-CSR  SFP-10/25G-LR
Cisco Catalyst 9000 switching transitions

Greater flexibility to the branch and to small and medium sized businesses who require low-end fixed access switching.

Access switching

Core switching
Cisco Catalyst 9000 Switching - built to see you through the next decade

**UADP 2.0, 2.0 mini, 3.0**
- Programmable pipeline
- Flexible tables
- Cisco StackWise® Virtual

**Standard leadership**
- Ethernet Alliance and NBASE-T
- IEEE

**Platform innovations**
- 802.3bz density (Multigigabit)
- 802.11ax optimized
- 802.3bt scale (60W)
- Campus-optimized 40G
- High Availability
- X86 with TB storage
- Campus-optimized thermals, mechanicals
- Bluetooth

* Not available at FCS
Catalyst 9200 Series switches
Next Generation of entry level access switches for IBN

**Fixed SKUs**
- 48 ports Full POE+/Data, 10G Uplink
- 48 ports Full POE+/Data, 1G Uplink
- 24 ports Full POE+/Data, 10G Uplink
- 24 ports Full POE+/Data, 1G Uplink

**Modular SKUs**
- 48 ports Full POE+/Data,
- 24 ports Full POE+/Data

**Differentiators**
- **Security**
  - 48 ports Full POE+/Data, 10G Uplink
  - 48 ports Full POE+/Data, 1G Uplink
  - 24 ports Full POE+/Data, 10G Uplink
  - 24 ports Full POE+/Data, 1G Uplink

- **Programmability**
  - 24 ports Full POE+/Data, 1G Uplink

- **Higher-efficiency AC**
- **FRU power supplies**
  - 125W
  - 800W
  - 1000W

- **Resiliency**
  - **Platinum Rated**
  - **Platinum Rated**

**Recommended for small scale SD-Access deployments**

**FRU uplinks***
- 4x 10G
- 4x 1G

**FRU fans***

*Cisco Catalyst 9200 Series Switch Differentiators
- UADP 2.0 mini
- Cisco IOS® XE Software
- SD-Access
- AES-128/MACsec-128
- Trustworthy solutions
- Perpetual/Fast PoE
- Cold Patching

*Catalyst 9200 Series switch modular SKUs only
Higher Stacking Bandwidth for increasing demand

Stack up to 8 members
Up to 160 Gbps bandwidth

Mix & match within*
1G/10G/25G/40G, 24/48-port, PoE/data

Not backward compatible
No mixing with Catalyst 2960X/XR

*9200 SKUs cannot mix with C9000L SKUs
What is new with Cisco Catalyst 9300 Series switching
New generation of fixed access switching

- 2.5G at the price of 1G
- 40G at the price of 10G
- Highest 2.5G, 5G, Multigigabit density in the industry
- Only stackable switch with 8x 10G and 2x 25G uplinks

Cisco Catalyst 9000 leadership
- UADP 2.0
- Cisco IOS® XE Software
- SD-Access
- x86 CPU and containers
- Encrypted Traffic Analytics (ETA)
- AES-256/MACsec-256
- Trustworthy solutions
- Cisco StackWise® Virtual
- IEEE1588 and AVB
- NBAR2
- Perpetual/Fast PoE
- Model-driven programmability
- Patching/GIR
- Streaming telemetry

Modular fans
- Modular uplinks
- Higher-efficiency AC and DC power supplies
- New Platinum rated

- 8x 10G
- 2x 40G
- 4x Multigigabit
- 4x 1G
- 2x 25G
- 315W AC
- 715W AC/DC*
- 1100W AC
New additions to the Cisco Catalyst 9300 Series

C9300-48UXM: 48-port 2.5 Gigabit Ethernet (12 full Multigigabit)

Modular Fans
- 8x10G
- 2x40G
- 4x Multigigabit
- 4x1G
- 2x25G

Modular uplinks
New
New
New

Modular power supplies
- 350W
- 715W
- 1100W

New Platinum rated
Cisco Catalyst 9300 Series switching innovations and benefits

Flexible ASIC
- UADP 2.0

Optional Bluetooth

Powerful CPU complex
- Intel x86 CPU
- 4-core 1.8GHz
- 8 GB memory
- 16 GB flash

Wireless scale
- 48x Wave 2 access points in 1RU

Most dense and flexible uplink offering
- 8x 10G, Multigigabit, 25G

Unmatched PoE
- Resiliency - perpetual/fast
- High power - 60W

Cisco UPOE®
Extends Catalyst 3850 leadership
- 1.5x throughput
- 4x VRF scale
- 2x wireless scale
- 4x Wave 2 access points supported
- 2x to 4x flash, memory
- Multigigabit and 25G uplinks
- Pluggable storage
- 2x CPU performance
- 4x uplink scale
- Densest 5G access
- 8x 10G, 2x 40G UL at price of 2x 10G

Local storage
- Removable storage (120GB)

Most flexible stacking
- Front* and back stacking
- Multiple cabling types - copper and fiber
- Best HA - NSF/SSO

Redundant fans

Intelligent power management
- Cisco StackPower®

Optional power supplies
- Power supplies (AC+DC)

High-efficiency power supplies

Extends Catalyst 3850 leadership
- 1.5x throughput
- 4x VRF scale
- 2x wireless scale
- 4x Wave 2 access points supported
- 2x to 4x flash, memory
- Pluggable storage
- 2x CPU performance
- 2x uplink scale
- 25G and Multigigabit uplinks
- Densest 5G access
- 8x 10G, 2x 40G UL at price of 2x 10G
Introducing the Cisco Catalyst 9400 Series switches
New generation of modular access

Industry's highest PoE scale

9 Tbps system bandwidth

 Supervisor
• Sup-1: 80G per slot access optimized
• Sup-1XL: 120G/240G per slot core optimized
• Sup-1XL-Y: 120G/240G per slot core optimized

Access line cards
• 24x Multigigabit
• 24x Cisco UPOE®
• 48x Cisco UPOE
• 48x PoE+, 48x data

Core line cards
• 24x 10G SFP+
• 48x 1G SFP
• 24x 1G SFP

Power supply
• 3200W AC
• 3200W DC
• 2100W AC

Cisco® Catalyst® 9000 switching leadership

UADP 2.0
Open Cisco IOS® XE
SD-Access
x86 CPU and containers
Encrypted Traffic Analytics
MACsec-256 encryption
Trustworthy solutions
Cisco StackWise® Virtual
IEEE1588 and AVB
NBAR2
Model-driven programmability
Patching and GIR
Streaming telemetry
Cisco Catalyst 9400 Series - Sup-1XL

Optimized for 1G and 10G Small to midsize backbone

40G
8p 10G uplinks
2p 40G uplinks

SD-Access
Border and edge

240G per slot C9404R
120G per slot C9407R
80G per slot C9410R

MPLS, NAT (16.9)
support

Extending the Cisco Catalyst 9400 Series switching performance without compromise

Now shipping
Cisco Catalyst 9400 Series - Sup-1XL-Y

- Optimized for 1G and 10G Small to midsize backbone
- 25G
- 40G
- 8p 10G uplinks
- 2p 25G uplinks
- 2p 40G uplinks
- SD-Access Border and edge
- 240G per slot C9404R
- 120G per slot C9407R
- 80G per slot C9410R
- MPLS, NAT (16.9) support

Extending the Cisco Catalyst 9400 Series switching performance without compromise
Cisco Catalyst 9400 Series Switches: Innovations and benefits

- N+1/N+N Modular power supply
- Extending 4500E/6500 Series leadership in modular access
- 4x throughput
- 3x client scale
- 2x wireless scale
- 4x power scale
- 3x buffering
- 10x bandwidth
- 4x memory and flash
- Lower power
- Better acoustics
- Higher MTBF
- MPLS VPN
- While preserving ...
- HA architecture
- Investment protection story

- Intel x86 CPU, 4 core 2.4GHz
- Re-architected power distribution for 10% higher energy efficiency
- Rear accessible fan tray for flexible cable management
- Dual serviceable fan tray
- Side-to-side airflow
- Up to 480Gbps per slot
- Cisco UPOE® simultaneously on all ports
- Native 25G/10G and 40G uplinks
- Up to 1TB SATA storage
- Fits nonstandard racks (16 in.)
- Efficient Platinum-rated power supplies
- Mix AC and DC power supplies
- Efficient handles for efficient weight distribution
- 3x buffering
- 10x bandwidth
- 4x memory and flash
- Lower power
- Better acoustics
- Higher MTBF
- MPLS VPN
- While preserving ...
- HA architecture
- Investment protection story
Cisco Catalyst 9400 Series Switches: State-of-the-art High Availability

- N+N power supply redundancy
  - Safeguard against power circuit failure

- N+1 power supply redundancy
  - Safeguard against power supply failure

- "Transparent" line-card design
  - Minimal onboard components for very high MTBF

- Unique uplink redundancy
  - Uplinks of failed supervisor continue to remain active

- Dual supervisors
  - With sub-50ms ISSU* and NSF/SSO

- Redundant fans
  - N+1 fan redundancy within fan tray; up to 2 minutes of fanless operation for servicing fan tray
Cisco Catalyst 9400 Series Switches - Multigigabit and PoE+

- 24x 1G + 24x Multigigabit Cisco UPoE®
- 48x 10/100/1000
- 48x 10/100/1000 PoE+

Shipping

24x Multigigabit + 24x 1G

PoE+ for price-neutral transition

192 ports of Multigigabit

Highest Multigigabit port density in the industry
Cisco Catalyst 9500 Series Switches
New generation of purpose-built fixed core/aggregation

UADP 2.0
• 40G at the price of 10G
• Industry’s first 40G enterprise switch
• Optimized 10G switch for midsize backbone

UADP 3.0
• 1TB SSD storage
• Industry’s first 100G enterprise switch
• 8x buffering vs. the competition

Extending Cisco® Catalyst® 4000 and 6000 Series leadership in fixed core
13x throughput (3.2 Tbps)
6x performance (1 Bpps)
No oversubscription
8x 40G density
Pluggable SSD storage
USB 3.0
4x memory and flash
2x CPU cores
Customizable templates
Cisco StackWise® Virtual
Cisco Catalyst 9500 Series Switches: New generation fixed core for high density 100G, 40G, 25G

Cisco Catalyst 9500 Series leadership
- Open Cisco IOS® XE
- SD-Access
- Fabric NetFlow
- ETA, SLN, MACSec-256
- AVB, NBAR2, DNS-AS, patching, GIR, streaming telemetry, model-driven programmability

Extending Cisco Catalyst 6000 Series leadership in fixed core
- 13x throughput (3.2 Tbps)
- 6x performance (1 Bpps)
- No oversubscription
- 8x 40G density
- Pluggable SSD storage
- USB 3.0
- 4x memory and flash
- 2x CPU cores
- Customizable templates

Accelerating high-speed transitions for all campus types

32P 100G
32P 40G/16P 100G
48P 10/25G + 4P 100G
24P 10/25G + 4P 100G
Cisco Catalyst 9500 Series Switches: Offering a comprehensive high-density portfolio on campus with 100G, 40G, 25G, 10G

Architectural flexibility
• Broad support for 10G, 25G, 40G, 100G from aggregation to core

Infrastructure investment protection
• Non-disruptive migration from 10G to 25G and beyond

Cost-effective optics
• Innovation in standards to support high-density, multilane optics

Platform benefits
• Up to 1TB SSD storage
• Customizable ASIC templates
• Same Cisco IOS® image
• N+1 fan redundancy
• 1:1 power supply redundancy
Cisco Catalyst 9500-16X
For low-density 10G/1G deployments

Low-density 10G deployments
Transition 4500-X
24x 10G/1G ports
2x 40G, 8x 10G uplink options
Cisco StackWise® Virtual support on day 1
Cisco Catalyst 9500 25G Portfolio
High-level overview

Built-in RFID (passive)
USB 3.0 flash drive/Bluetooth dongle**
2.4-GHz quad-core x86 CPU
16 GB of DDR4 DRAM
36 MB of unified packet buffer
Next-generation UADP 3.0 ASIC
Every port 25G, 10G, and 1G* capable
Uplinks 100G and 40G capable

C9500-48Y4C (Cisco Catalyst 9500 Series high-performance switch with 48x 25 GE + 4x 100GE )

C9500-24Y4C (Cisco Catalyst 9500 Series high-performance switch with 24x 25 GE + 4x 100GE )

* Except GLC-T and TE
** Roadmap
Industry’s First Enterprise Class 100G Switch

C9500-32C (Cisco Catalyst 9500 Series high-performance switch with 32x 100GE)

- Built-in RFID (passive)
- USB 3.0 flash drive/Bluetooth dongle**
- 2.4-GHz quad-core x86 CPU
- 16 GB of DDR4 DRAM
- 72 MB unified packet buffer
- 2x UADP 3.0 ASIC
- Every port 100G, 40G, 10G,* and 1G** capable

C9500-32QC (Cisco Catalyst 9500 Series high-performance switch with 32x 40GE)

- Built-in RFID (passive)
- USB 3.0 flash drive/Bluetooth dongle**
- 2.4-GHz quad-core x86 CPU
- 16 GB of DDR4 DRAM
- 36 MB unified packet buffer
- 1x UADP 3.0 ASIC
- Upper ports: 100G, 40G, 10G,* or 1G**
- Lower ports: 40G, 10G,* or 1G**

* With QSA adapter
** Roadmap
Simplified operations and serviceability with Cisco Catalyst 9000 switching
Lower TCO with better ergonomics

- Inventory management efficiency with built-in RFID
- Ease of serviceability with blue beacons on each component
- Ergonomic design with industry-standard icons
- Wireless console access with Bluetooth
New packaging and licensing

Network stack and Cisco DNA component are bundled together

On expiration of Cisco DNA term, all functionality continues to operate. Entitlement for perpetual functionality remains.
Catalyst 9000 Switches Licensing Tiers
Key to enabling continuum of Cisco’s IBN innovations in every network

Cisco DNA Essentials
§ Day-0/Day-1 Automation with PnP, LAN Automation
§ Element Mgmt. with SWIM, Discovery, Inventory
§ Network Visibility with Full Flexible NetFlow
§ On-Device scripting with Embedded Event Mgr.

Cisco DNA Advantage (Incl. Cisco DNA Essentials)
§ Software-Defined Segmentation with SD-Access
§ Predictable Application Experience with App Policy
§ Advanced Assurance with Cisco DNA Assurance
§ Reduced Network Downtime with Patch Lifecycle Mgmt.
§ Malware detection/prevention with ETA
§ Application Visibility with NBAR2
§ Monitoring & Troubleshooting with ERSPAN, Wireshark

Network Essentials
§ Essential Switching with Layer2, Routed Access
§ DevOps Integration with NetConf/Yang, RestConf, Guest Shell

Network Advantage (Incl. Network Essentials)
§ Full Routing with BGP, HSRP, OSPF, VRF, MPLS
§ End to End Security with TrustWorthy Systems, MACSec link encryption
§ Resiliency for mission Critical Environments with ISSU, NSF, Stackpower, Patching (CLI)

Value Add with Cisco DNA Center
Key Benefits without Cisco DNA Center
Unleash Cisco’s IBN Innovations
Cisco Catalyst Differentiators
Raising the bar for Competition
## Catalyst 9000 Switches - Advantage vs. Essentials

### Catalyst 9200, 9300, 9400, 9500 Series switches

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§ Catalyst 9000 switching HW includes the **Perpetual** Network Stack - Network Essentials or Network Advantage

§ Mandatory to attach Cisco DNA License when ordering Catalyst 9000 switches

§ Cisco DNA License includes Switch and Cisco DNA Center Features

* Not available on Catalyst 9200 Series Switches  
+ Catalyst 9400/9500 Series switches